EPRI Retail Market Tools and Services

Task 5 Final Report

THELMA PROJECT SYNTHESIS

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THELMA

The High Efficiency Laundry Marketing Metering Analysis

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CHAPTER 1
INTRODUCTION

PROJECT SUMMARY

Interest among water, electric, and natural gas utilities in the potential energy and water savings from energy efficient washing machines precipitated the formation of The High Efficiency Laundry Metering & Marketing Analysis (THELMA) project. The continuing evolution of energy efficient washing technology, particularly "h-axis" washers, has stimulated interest in assessing whether these washers would provide substantial energy and water savings that could benefit consumers and provide demand side management alternatives for sponsoring utilities. The h-axis technology has been popular in Europe but not widely adopted in the U.S. The THELMA research project was designed recognizing that successful utility support for this product would require data on energy and water savings, as well as information on customer preferences and the dynamics of the washer market.

THELMA is an Electric Power Research Institute (EPRI) collaborative project, sponsored by a consortium of 29 electric, gas, water and waste water utilities and organizations. It was established to research the impacts and market potential of efficient residential washing machines before significant investments were made by project sponsors to promote h-axis washers. The broad goals of THELMA are to identify issues and strategies necessary to leverage a lasting market transformation to efficient washers. To address these issues, the THELMA research included three primary objectives:

- Confirm engineering estimates of savings and assess customer laundering habits.
- Identify potential barriers to market penetration of efficient clothes washers.
- Identify market intervention issues critical to utilities and suggest strategies for the marketing of efficient clothes washers.

In today's market, washers can be broadly classified into two types: vertical axis (v-axis) and horizontal axis (h-axis). H-axis washers have several advantages over standard v-axis washers. H-axis machines use considerably less water and possibly less detergent for a given load size, and the higher spin speeds of some models result in more water extraction and thus lowers the drying time. Energy savings are realized because less energy is required for water heating and clothes drying. The principal disadvantages of h-axis washers are that they

require an electronically controlled direct current motor, and they have a more sophisticated suspension system. These requirements add to the costs of h-axis washers and potentially impact their reliability.

The current residential clothes washing market in the United States is dominated by v-axis washers (approximately 98 percent). Therefore, the potential exists for substantial energy, water, and waste-water savings by transforming the market to h-axis washer technology.

RESEARCH DESIGN

The THELMA research design recognized that water and energy "impact" estimates from lab tests are not an effective gauge of success by themselves. Therefore, the THELMA research involved a combination of market and evaluation research integrated in a comprehensive design. This design included three distinct components: (1) a market assessment, (2) an appliance distribution system analysis, and (3) an impact analysis. Figure 1-1 presents an overview of the major project components and illustrates the linkages between each of these major research tasks. A brief description of each research component is given below.

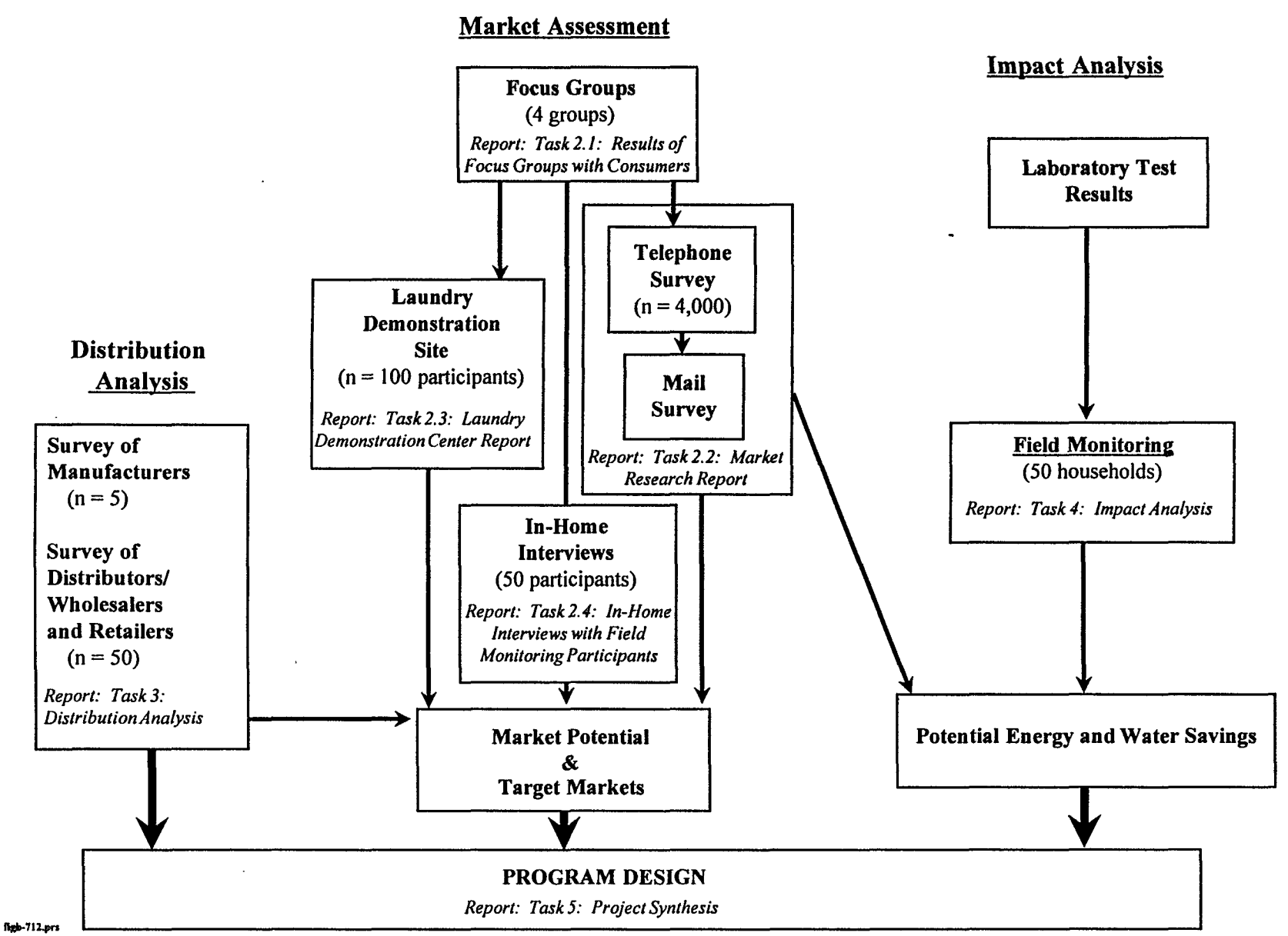
Market Assessment

The market assessment addressed consumers' views on household laundering, their household's washing behavior, and their reaction to new technologies. The key issues in the market assessment for efficient washers were understanding (1) the equipment features that consumers view as important; (2) the market barriers and opportunities for energy-efficient washers; and (3) the near-term potential for customer acceptance of energy-efficient washers. These three issues were all crucial to estimating customers' reactions to the promotion of efficient washers in the market.

The key research activities for the market assessment consisted of a series of focus group discussions with consumers, a market research survey, a laundry demonstration center, and in-home interviews with households that participated in the impact portion of the study.

Focus groups with consumers. Early in the project, four focus group discussions were held with a total of 40 consumers to explore household laundry behaviors and the desirable characteristics of washers. The focus groups led off the project and provided information for the rest of the project's efforts. Topics for discussion during the focus groups included current laundry practices and equipment, feedback on the design for a laundry diary, washing machine buying criteria, attitudes toward h-axis washers, propensity to buy h-axis washers, and the appeal of utility programs. The results of these groups are summarized in *Task 2.1 Final Report: Results of Focus Groups with Consumers.*

Figure 1-1: Summary of THELMA Research Components



Market research survey. The market research survey provided an opportunity to develop quantitative measures of customer reactions to the h-axis machine. The survey was designed to quantify customer awareness of and willingness to accept h-axis machines and gauge the effect of utility investment on the technology. The market research survey collected quantitative data on many of the same topics addressed in the focus group. The survey also collected household demographic and socioeconomic data, as well as data on respondents' current laundry practices.

The market research survey consisted of a general U.S. population sample as well as 12 subpopulations representing various THELMA utility service areas. The survey was conducted using a combination of telephone and mail survey procedures. The data collection period started on May 25, 1995, and ended on November 10, 1995. Random samples of households nationwide were initially drawn using random digit dialing. In the phone survey, residences were screened for the presence of a washer in the dwelling. Respondents who completed the telephone survey (4,076 respondents) were then asked to fill out the mail survey and also record their laundry behavior for a one-week period in a diary. Of the 4,076 households with washers who completed the telephone screening survey, 69 percent or 2,806 agreed to participate in the mail survey. Of the 2,806 surveys mailed, 1,725 households completed the mail survey and diaries, representing an overall mail response rate of 62 percent. Results of the market research data for the U.S. population and the different THELMA areas are reported in *Task 2.2 Final Report: Market Research Report.*

Laundry demonstration center. One of the difficulties in evaluating new products or technologies is consumers' lack of knowledge or experience with the product. This result was substantiated by the market research survey and also by the early focus groups. To overcome this obstacle, the THELMA research design included the establishment of a demonstration center, which allowed 100 consumers to see an h-axis machine, actually do laundry in an h-axis machine, compare two types of h-axis machines (a front-loading and a top- loading model), and report their interest in purchasing an h-axis machine once they were more familiar with it. Additionally, researchers had a first-hand opportunity to observe consumer reactions to the machines. The results of the laundry demonstration center are summarized in *Task 2.3 Final Report: Laundry Demonstration Center.*

In-home interviews with field monitoring participants. The study also included in-home tests with h-axis machines. These tests were designed to measure customer reactions to the h-axis machine after significant use time had elapsed and also measure water and energy savings under real-life conditions. Fifty households were recruited to participate in the field monitoring task of the impact analysis component. Fieldwork was conducted in two phases: Phase I was held at 26 sites in Washington state (September - December 1995), and Phase II

was held at 24 sites in Oregon and California (May - August 1996)[1]. Participants actually used the machines to do their washing for a 7-week period. In-depth on-site interviews were conducted at the beginning and end of the 7-week h-axis period, and weekly telephone calls were made to monitor customers' reactions and issues with the h-axis machines. Participants also kept a weekly laundry diary. The final interviews qualitatively measured participants' reactions to using the h-axis washer in their own homes and their interest in purchasing this type of washer in the future. The results of the qualitative interviews with these participants are summarized in *Task 2.4 Final Report: In-Home Interviews with Field Monitoring Participants.*

Distribution System Analysis

In addition to assessing consumer response to the h-axis machine, the project team decided that to best succeed in the market an investigation of washing machine distribution channels was also essential. The distribution system research was of particular importance to the THELMA project because it helped clarify the characteristics of the market infrastructure for efficient washers. The distribution system analysis consisted of interviews with 55 key manufacturers, distributors, and retailers of laundry equipment, including h-axis washing machines. The interviews primarily collected qualitative data exploring trade allies' awareness of h-axis machines, perceived benefits of h-axis and v-axis machines, barriers to additional sales of h-axis machines, target markets for current h-axis machines, and reactions to utility programs supporting this technology. The results of the trade ally interviews are summarized in *Task 3 Final Report: Distribution Analysis.*

Impact Analysis

The first step in analyzing h-axis washer technologies was to conduct laboratory tests on several different models[2]. These tests were conducted prior to the work summarized in this project, but the impact analysis was designed to build on these results. As part of this project, to test savings estimates under real-life conditions, the field monitoring task (impact analysis) was designed to provide savings estimates based on actual customer use of the machines in their homes. Fifty in-home tests were conducted. Energy and water usage was first monitored for 6 weeks using the existing v-axis washer in the home and then for 7 weeks with an h-axis machine that was installed in the home. In addition, the 50 monitored households kept a laundry diary during the monitoring period. Data from the diary identified and quantified the behavioral changes in consumers' use of the h-axis washer compared to

[1]A third field test is being conducted in Spring of 1997. Phase III will involve in-home tests of a third model in 20 homes. Results from these Phase III tasks will be summarized in an additional EPRI report.

[2]The lab tests are summarized in "The High Efficiency Laundry Metering and Marketing Analysis (THELMA)- Laboratory Testing Phase" Prepared by Arthur D. Little, Inc., Cambridge Massachusetts.

their use of the v-axis washer. The results of the energy and water savings are summarized in *Task 4 Final Report: Impact Analysis.*

Organization of the Report

The remainder of this report summarizes the results obtained from the various research components and provides guidelines to support marketing efforts for utility h-axis programs. Chapter 2 provides a summary of current market conditions and dynamics. Chapter 3 uses this market assessment to develop conclusions and recommendations for marketing programs.

CHAPTER 2
CURRENT MARKET STRUCTURE AND DYNAMICS

To effectively support the market for h-axis washing machines, it is important to understand the dynamics of the current washer market, the potential size of the h-axis market, the impact of specific features and pricing on market share, and ways to effectively position this new product in the existing market. The findings from the various components of the THELMA project provide an assessment of the current market dynamics. These findings are summarized in this section as follows:

- Characteristics of the washer market
- Annual sales patterns
- Laundry behaviors
- Satisfaction with current washers
- Buying behaviors
- Customer reactions to h-axis washers
- Trade ally reactions to h-axis washers
- Pricing
- Purchase intent
- Potential energy and water savings

CHARACTERISTICS OF THE WASHING MACHINE MARKET

The washing machine is nearly ubiquitous in U.S. households. About 80 percent of households in the U.S. have a washing machine. Based on an estimated 96 million[1] households in the U.S., this means that approximately 77 million households have washers present. Although washing machine saturations are generally high throughout the country, there are some areas where saturations drop significantly. In the THELMA utility service areas, the saturation rate of washers varies from a low of 47 percent for the Metropolitan Water District of Los Angeles to a high of 89 percent for the Puget Power service area. In general, the more urbanized a service territory and the higher the density of multifamily dwellings, the less likely residences are to have a washer on premises.

One important characteristic of the current stock of washing machines is that it is dominated by three major U.S. brands at both the national and service-territory level. Data from the national sample included in the market research survey revealed that Whirlpool (53 percent), Maytag (20 percent), and General Electric (15 percent) have the largest shares of machines in

[1]The states of Alaska and Hawaii are excluded.

household use.[2] Given that customers frequently buy the brands they are familiar with, this fact demonstrates the importance of offering major U.S. brand h-axis machines to facilitate increased adoption.

A second important observation of the current market is that washers tend to be kept by customers for a fairly long period of time before replacement. Based on data collected in this project, the average age of the existing stock is approximately 6 years. Data on the age of existing washers suggest that most washers are replaced by the time they are 16 years old. Currently, 4.4 percent of the washers in the national sample are 16 years old or older. This suggests that nationally approximately 3.4 million washers are past the typical replacement age.

Customers also tend to believe their own washer is in good shape. Most of the national-sample households reported their machine was in excellent (44 percent) or good (45 percent) condition. Only 11 percent of households reported that their existing washers were in poor (2 percent) or fair (9 percent) condition. Washer age data, on the other hand, suggest that 4.4 percent of washers are getting old enough to be considered for replacement. The above data also suggest that about 11 percent of households may be in the market for a new washer because their existing one is in fair or poor condition. This represents about 8.5 million units.

The third important characteristic of the current market is that it is saturated with large or extra-large capacity machines. Most washers have either large or extra-large tubs. Nationally, 42 percent of households with washing machines reported tub sizes in the large range (14 to 17 lbs), and 37 percent reported sizes in the extra-large range (18 to 20 lbs). Only 13 percent of U.S. washing machines have regular-size tubs (12 to 13 lbs), and even fewer (2 percent) have small tubs (less than 12 lbs).

In terms of h-axis washing machines, the market research survey indicated that approximately 2.1 percent of U.S. households with a washer present in the dwelling reported having an h-axis machine. This percentage translates into an overall market saturation of 1.7 percent for all households. This means that approximately 1.6 million h-axis machines are currently being used in homes throughout the U.S.

[2]According to Home Furnishing Network Magazine, March 11, 1996, the top three washing machine manufacturers in terms of market share are: Whirlpool (50%), GE (25%) and Maytag (14%). Appliance Manufacturer Magazine's 1996 market profiles lists the top three manufacturers of washing machines as Whirlpool (53%), GE (17%) and Maytag (17%).

Annual Sales Patterns

Washer sales in the U.S. in the past few years have been relatively strong as a result of favorable economic conditions. In the national market survey, 4.9 percent had purchased a new washer in the past 12 months. This indicates that the recent annual purchase rate for new washers among existing households (not including unoccupied new construction) is about 4.9 percent nationally (4.7 million households). AHAM data and other shipment-based estimates show sales as high as 6 million units in 1995, but these include sales to new construction and developers that would not be captured in a survey of existing households.

Sales of these replacement washers occurs primarily through appliance retailers. The majority of sales pass through a few large national and regional retailers while a smaller proportion pass through small independent dealers/distributors. In the clothes washer market, extensive appliance stocking is the norm. Almost all retailers interviewed in this study order and stock all or most of their clothes washers prior to the sale. This includes larger department or chain stores that keep their stock in a central warehouse. Most retailers sold between 3 and 6 brands of clothes washers. Some sold as many as 9 brands from 6 manufacturers; some sold as few as one brand from one manufacturer.

Most current h-axis sales pass through smaller independent dealers who distribute the few specialty brands of h-axis machines. Some major retailers used to carry the White-Westinghouse h-axis machine, but this brand has been discontinued. Major retailers are already carrying the Frigidaire Gallery model in selected areas. Retailers view the h-axis or tumble-action machines as the only type of energy-efficient washer available. In fact, many said that no other type of energy-efficient machine currently exists. Others said that a few agitator machines have energy-saving cycles or features, but most felt that in terms of energy efficiency all agitator machines were basically the same.

LAUNDRY BEHAVIORS

Laundry behavior at the household level will greatly affect both customer acceptance of h-axis machines and the potential water and energy impacts the h-axis machine can achieve. The study produced several key findings on laundry behavior.

One key finding is the average number of loads per week (Table 2.1). Based on data from the national market survey, the average U.S. household does 6.7 loads of laundry in a typical week (90% confidence interval: 6.4, 7.0). This is fairly close to other estimates of typical

loads per week for households with washers.[3] Average loads per week varied substantially across service territories. Households in Idaho Power's service area reported the highest average of 7.4 loads per week while households in the Seattle City Light area had the lowest average, only 4.8 loads per week.

Table 2.1: Wash Loads Per Week (National Sample)

Service Territory	Average Number of Loads	Median Number of Loads	Percentage Doing <=5 Loads (%)	Percentage Doing >=8 Loads (%)
DOE (national)	6.7	5	53	29
Bonneville Power Administration	6.9	5	55	30
Idaho Power	7.4	5	50	34
Los Angeles Department of Water & Power	5.6	4	65	21
Metro Water District of Southern California	6.0	5	58	24
Ontario Hydro	5.9	5	63	21
Pacific Gas & Electric	6.2	5	56	26
Portland Water Bureau	5.9	5	61	22
Puget Power	6.9	5	56	27
Seattle City Light	4.8	4	72	15
Snohomish Public Utility	6.9	5	54	30
Tacoma Public Utilities	6.7	5	51	28
City of Tampa Water Department	5.9	5	59	28

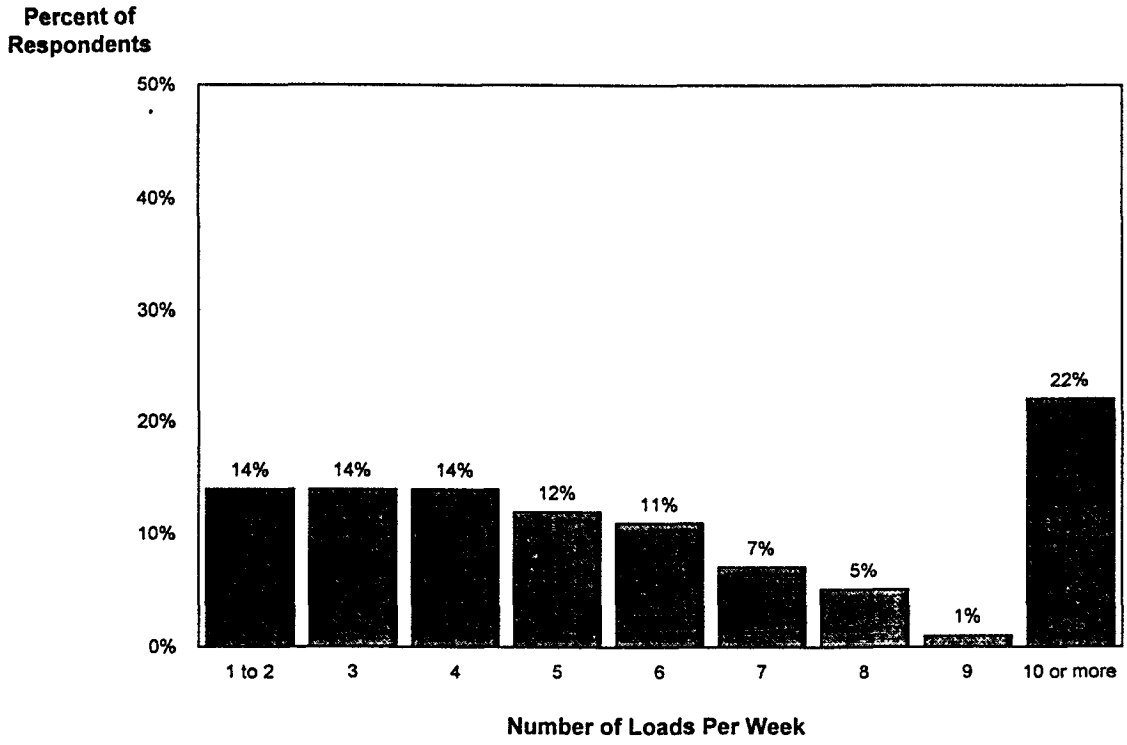
* Source = Market Research Survey

An important additional finding, however, is that more than half (53 percent) of the households in the U.S. wash five or fewer loads of laundry a week. This suggests that many households do only a limited number of loads per week and that only a few households do a

[3]The Washington State Energy Office assumes that U.S. household clothes washing machines wash an average of 380 laundry loads annually, (7.3 weekly) based upon surveys conducted by the Proctor and Gamble Company in 1988 - 89. This figure is reported by the U.S. Department of Energy (DOE 1990). "Energy-Efficient Horizontal Axis Washing Machines: Technology Assessment and Cost Effectiveness Evaluation" WSEO Publication 92-110, September, 1992.

substantial number of loads per week (Figure 2.1). This skewed distribution of loads per week was also found in all 12 service territories of the utilities participating in the study.

Figure 2.1: Wash Loads in a Typical Week (National)

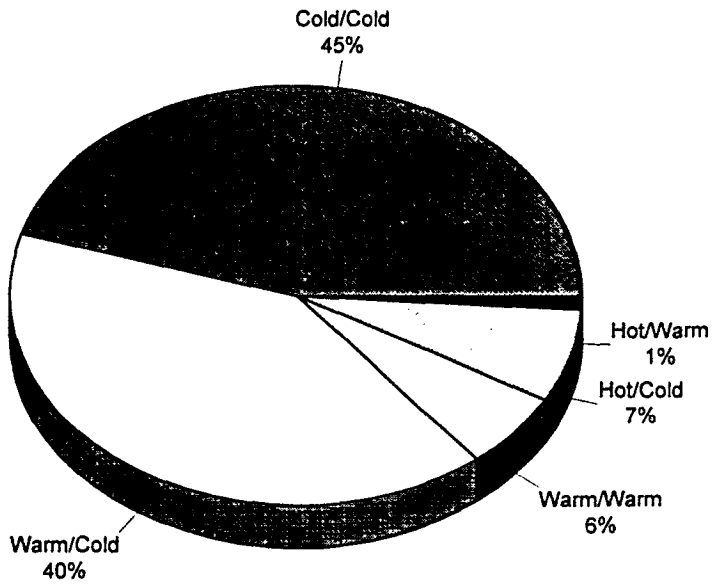


This latter finding is important because the energy and water savings will be larger for households that do more loads and lower for households with fewer loads. The skewed nature of the distribution suggests that many households considering an h-axis washer may not realize the full savings if savings estimates are based on the average number of loads washed by households in a given service area.

Another very important variable for understanding the impacts of h-axis technology is water temperature setting. Since much of the potential energy savings of h-axis machines is associated with heating water, households that wash their clothes in warm or hot water are likely to realize greater savings than households that wash primarily in cold water. The market research data show that most loads are washed in either cold/cold or warm/cold for wash and rinse temperature settings. Specifically, of all the loads washed nationally 45

percent are cold/cold, 40 percent are warm/cold, 7 percent are hot/cold, 6 percent are warm/warm, and 1 percent are hot/warm (Figure 2.2).

Figure 2.2: Wash and Rinse Temperature Settings of Wash Loads (National)

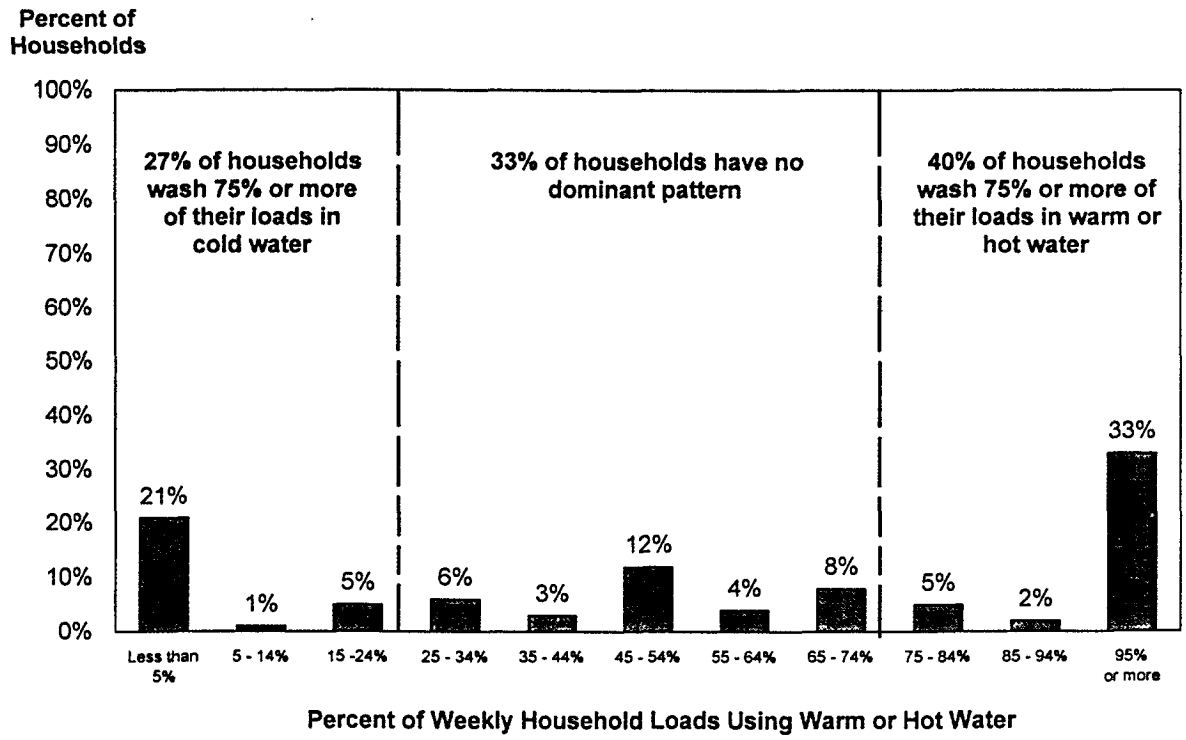


Similar patterns were found in the qualitative interviews. Only 18 percent of the in-home interview participants' laundry loads were done using hot washes or warm-wash/warm-rinse cycles. One-half of the loads were done on warm/cold settings and one-quarter on cold/cold settings. Demonstration center participants were somewhat more likely to use either a hot wash or a warm-wash/warm-rinse cycle (27 percent of the loads). Almost half the loads were done on warm/cold settings (46 percent), while over a quarter were done on cold/cold settings (27 percent).

The results reported above show the distribution of washing water temperatures across all loads washed. As noted above, the results suggest that about half of all loads are washed in cold water and half are washed using warm or hot settings. However, these findings alone hide the fact that not all households split their loads the same way. Figure 2.3 shows that some households use predominately cold water, while other households use predominately

warm water. While still other households have no dominant washer temperature pattern. Specifically, Figure 2.3 shows more than a quarter (27 percent) of households do more than 75 percent of their laundry with cold wash setting. Another 40 percent of the households do more than 75 percent in warm or hot water, and the remaining third of the households use a mix of different temperature settings for their laundry. The energy savings from h-axis washing are more likely to be realized from households that use a mix or predominately warm water than from households who use predominately cold water.

Figure 2.3: Household Wash and Rinse Temperature Settings



Several key relationships between household demographics and laundry behavior were identified in the research. Most importantly, and fairly obviously, households with children typically do more laundry than households without children. In the national sample, couples with children did about 7 loads per week, and single parents with children did about 6 loads per week. Couples with no children did about 4 loads per week. As expected, the more people in the household, the more loads washed per week. Based on the data from the national market survey, on average each person in the household contributes about 2.5 loads

to the week's laundry. Households composed of single individuals living alone reported the lowest number of loads, only about two loads per week.

The research also confirmed another important expected result: Women are more likely than men to do the household's laundry. In 67 percent of the national-sample households, women were responsible for doing all of the laundry (Table 2.2). In contrast, men were responsible for all of the laundry in only 8 percent of households. Twenty-four percent of the national sample reported that both sexes are responsible for the household's laundry.

The national sample results were confirmed by the qualitative research. Women in the in-home interviews were regularly involved with doing the laundry, with most doing the wash at least three-quarters of the time. All demonstration center respondents (80 percent of whom were women) were regularly involved with doing the wash, with 71 percent reporting they "always" did the wash.

Table 2.2: Participation in Washing By Household Composition (National Sample)

	Household Composition					
Household Member Who Usually Does the Laundry	**Individuals Living Alone**	**Single Parents With Children**	**Couples With Children**	**Couples Without Children**	**Individuals Sharing a Residence**	**All House -holds**
Female only	60%	79%	64%	71%	65%	67%
Male only	38	17	1	2	18	8
Both male & female	2	0	34	25	18	24
Other	0	4	1	2	0	2
Total	100%	100%	100%	100%	100%	100%

* Source = Market Research Survey

A few other key bivariate relationships also surfaced in the national sample survey. First, higher income households reported doing more loads per week than lower income households. Households in the less-than-$20,000 income group did 4 loads per week, while households in the greater-than-$75,000 group did 6 loads. In addition, families living in single-family homes did more loads of laundry than families living in multifamily units. Residents of single-family homes did about 5 loads a week. Residents of multi-family buildings did about 4 loads.

SATISFACTION WITH CURRENT WASHERS

Satisfaction with current washers was measured to identify potentially effective marketing approaches for the h-axis machine. Overall, the findings from the focus groups, in-home interviews, and demonstration center generally confirmed Lever Brothers' data that 75 percent of consumers are satisfied with their washers. Most focus group participants expressed satisfaction with their washers, and 84 percent of in-home interview participants were very or somewhat satisfied with their v-axis washer. Demonstration center participants were also satisfied with their washers, with 86 percent giving very or somewhat satisfied ratings (49 percent very; 37 percent somewhat), and only 14 percent giving dissatisfied ratings. The market survey did not specifically ask respondents' overall satisfaction with their current washer, but 82 percent of respondents indicated they were satisfied with their washer's cleaning performance.

Participants in the focus groups and interviews gauged their satisfaction by referring to the washer's versatility (e.g., adapts to different laundry needs), its reliability (e.g., good maintenance record, durability) and its ability to get clothes clean.

Complaints about washers were minor (e.g., given the chance to replace their washer, some participants said they would opt for slightly different features). The more substantial complaints were related to unbalanced loads or clothes tangling around the agitator. However, participants usually blamed these problems on the age of the machine or on themselves (e.g., overloading the machine or loading the "wrong" mix of clothes). Less frequently mentioned problems included poor cleaning performance, mechanical problems, noise, and limited settings.

BUYING BEHAVIORS

One of the primary goals of the THELMA study was to identify strategies that would increase the purchase of h-axis washers and thus help transform the existing market. To effectively market h-axis technology, it will be important to understand the washing machine purchase process. The national market survey, in-home interviews, and demonstration center components all provided feedback on key aspects of buying behavior.

Among all household types and across all purchase patterns, women are more likely than men to be involved in both shopping for and purchasing a new washing machine. However, it is worth noting that in households composed of couples with or without children, the majority report that both sexes shop for a new washer (63 and 68 percent, respectively) and make the decision to purchase it (58 and 52 percent, respectively, Table 2.3). This information was confirmed in the in-home interviews where women almost always had a role

in buying new washers. They were either solely responsible for collecting information and deciding which model to buy, or they shared these decisions with the man in the household.

Table 2.3: Purchase Decision Making (National Sample)

	Household Composition					
Household Decision Maker	Individual Living Alone	Single Parent With Children	Couple With Children	Couple Without Children	Other Individuals Sharing	All House-holds
Female Only	63%	79%	36%	45%	44%	45%
Male Only	33	17	7	4	21	11
Both Male & Female	2	0	58	52	35	44
Other	2	4	0	0	0	1
Total	100%	100%	100%	100%	100%	100%

* Source = Market Research Report

In the national market research survey, individual importance ratings for 17 washer features showed that manufacturer's reputation (93 percent) and warranty (88 percent) are the most important features in selecting a washer. These features were closely followed by dealer's reputation, the washer's perceived wear and tear on clothes, energy efficiency, and capacity (all rated important by more than 80 percent of respondents).

Demonstration center and in-home interview respondents were asked to state the three most important features they looked for when buying a new washer. The most frequently mentioned was capacity, followed by specific features such as dispensers, cycles, temperature choices, water-level settings, etc. The washer's reputation/reliability, purchase price, and efficiency were also deemed important.

Given the focus of the THELMA study, the spontaneous mention of "efficiency" by respondents is very interesting. When probed further about their views on efficiency, two-thirds of demonstration center respondents (69 percent) said that efficiency would be at least somewhat important in their buying decision.

However, both demonstration center and in-home interview respondents were likely to define washer efficiency in terms of how they used their washers (e.g., selecting warm/cold water; adjusting the water level to the size of the load), rather than think of efficiency as intrinsic to the technology of the washer. Still, many participants *were* concerned about rising utility rates and were interested in cutting their bills.

CUSTOMER REACTIONS TO THE H-AXIS WASHER

Participants in the focus groups, demonstration center interviews, and in-home interviews were asked their initial impressions of h-axis washers. Demonstration center participants were asked about two specific h-axis washers after completing a test wash. One of the washers was Washer A, an American made front loading model. The other washer was Washer B, a top-loading American made model. In-home interview participants were asked for their overall assessment of the h-axis washer installed in their home after the 7-week in-home trial. Two models of washing machines were represented in the in-home trial. Washer A which was also used in the demonstration center, and Washer C a front-loading European model. Customer reactions to h-axis washers by research component are summarized below.

Focus Group Reactions

Focus group participants were asked for their spontaneous reactions to verbal descriptions and photographs of h-axis washers. Because participants were unfamiliar with the h-axis washer technology, most responses were based on past associations with "similar" machines or on visual clues. Some participants were reminded of old-fashioned washers (e.g., Bendix). These associations then led them to question why front-loading machines had become obsolete in the United States. Others were reminded of Laundromat washers. Although Laundromat machines had some positive connotations (e.g., able to cope with bulky loads), they were also considered to be angular and heavy duty. These associations confused participants and led them to question the suitability of h-axis washers for a residential setting. A few participants associated the descriptions and photographs with machines that are used in Europe.

Many focus group participants were emotionally resistant to the concept of a front-loading washer. Some participants adamantly disliked this format but had difficulty explaining why. Others gave more tangible reasons for disliking front-loading machines, such as concerns about leaking, having to bend to load and unload, and child safety concerns. Participants were introduced to a top-loading h-axis machine, which in theory was a potential solution to problems with the front-loading version. However, the technology of this machine was not an easy concept for participants to grasp or understand. Many were puzzled by the "double-door" feature and were more concerned that this might be difficult to use, or would be less durable than a more familiar design.

After exploring spontaneous reactions, participants were shown a series of simple descriptions and diagrams to help them understand the different mechanical actions and cleaning methods used by h-axis and v-axis washers. Again, participants raised many questions about h-axis washers. Specifically, they speculated on three main issues: (1) cleaning ability, (2) basic operation, and (3) specific tasks (e.g., ability to handle huge loads, small loads of delicates, pre-soaking, etc.).

Demonstration Center Reactions

Demonstration center participants were shown a top-loading and a front-loading h-axis machine. They performed a test wash using the front loader. It is important to remember that the findings discussed below are for two specific brands of washers and therefore may not apply to other h-axis machines, especially findings on specific product features.

Response to Front-Load Washer (Washer A). The demonstration center tracked participants' perceptions of a front-loading h-axis washer (Washer A) before and after a test wash.

> *Capacity.* On first impression, half of the demonstration center participants thought Washer A had a smaller capacity than their own v-axis machine. When loading the h-axis washer for the test wash, they had difficulty gauging how full to fill the drum and usually asked for guidance. Seeing the movement of clothes and water in the machine once it was operating often changed their perceptions about capacity. Over a third remarked that they could have added more clothes. Although the test wash helped participants judge capacity more accurately, many still wanted reliable data on the true capacity of h-axis washers and the relationship between capacity and cleaning performance.
>
> *Cleaning and rinsing ability.* After watching the front-loading Washer A go through its wash and rinse cycles, about half of the participants said that clothes washed in this washer would get as clean and be as well rinsed as in their v-axis washer. However, the other half either expected inferior cleaning/rinsing results or were unsure. These participants were confused about how clothes could get clean without immersion in water or without the scrubbing action of an agitator. They wanted more hands-on proof about the machine's performance under a variety of real-life settings. Even participants who thought the washer would do a good job wanted to see test results or try the machine out at home using their own clothes.
>
> *Other Reactions to Washer A.* Features on Washer A that demonstration center participants generally found appealing included its overall appearance, quietness, gentleness on clothes, familiar controls, better balance, and convenient dispensers for bleach/softener. Some areas of concern included bending to load and unload, fear of leaks, accessibility of controls to children, and dispenser spills.

Response to Top-Load Washer (Washer B). Demonstration center participants were also shown a top-loading h-axis washer (Washer B) to stimulate reactions to the front- versus top-loading features of the two machines. Reactions were quite consistent and reveal how complex consumers' evaluation of a washer can be.

Top-loading versus front-loading. After examining both machines, the vast majority of respondents said they preferred top-loading h-axis washers - *in theory* - because of the familiarity and perceived convenience of this mode of access. A quarter said they definitely preferred front-loading h-axis washers because they felt the overall design was more logical, more familiar from Laundromat experiences, and more user friendly.

However, the majority of participants who preferred a top-loader also said they would be unlikely to ever buy Washer B. Reaction to Washer B was dominated by negative response to the latched opening used to enter the drum, as well as concerns about the machine's basic quality and finish.

In-Home Interview Reactions

Participants in the in-home trials used one of two types of front-loading h-axis washers. Washer A was the same as Washer A in the Demonstration Center and was installed in 46 sites. Washer C was used only in the in-home test. It was tested with four customers. After using one of the two h-axis washers for 7-weeks, participants most liked the h-axis washer's quietness, cleaning ability, and efficiency. Reactions to key areas are as follows:

Front Loading Feature. The front-loading access was by far the least popular feature of the h-axis washer. People encountered a variety of front-loading access problems, related to both loading (e.g., seeing inside the dark drum; stuffing clothes into the small hole; judging how many clothes to put in) and unloading (e.g., tugging clothes through the small hole; untangling coiled clothes; retrieving items stuck to the drum; and bending and stretching).

Capacity. On first sight, many people suspected the h-axis washer might be smaller than their own machine. After experimenting for seven weeks, most people concluded that the washer had the same capacity as their own washer.

Cleaning Ability. All four participants using Washer C said the clothes emerged brighter and cleaner than from their own washer, while most users of Washer A said its cleaning performance was the same as their own washer. One-third thought the h-axis washer's tumble action would be gentler on clothes than their own agitator washer.

Drying Time. All four participants using Washer C said their dryer time was cut by 10-15 minutes because clothes were far less damp after the final spin. In contrast, many users of Washer A noted clothes were damper after the final spin than in their own washer, and thus required longer in the dryer.

Energy and Water Savings. Most in-home-trial participants concluded that the h-axis washer used less water than a v-axis washer, but they had more difficulty gauging the washer's energy consumption. Some participants suspected that the extra rinse, longer wash cycle, lack of water-level setting, and longer dryer time might undermine the washer's efficiency.

TRADE ALLY REACTIONS TO H-AXIS WASHERS

The overall impression of h-axis washers was very positive among all the retailers/distributors interviewed in this project. Even retailers not currently selling h-axis washers had a positive overall impression of the machine. But these respondents were also cautious about the machine's value in the current market and skeptical of some of the benefits.

Retailers who sold an h-axis model were especially impressed with the machines. These trade allies consistently cited the following benefits or desirable features:

- H-axis machines are more energy efficient.
- H-axis machines are less damaging to clothing.
- The machines have a higher spin rate resulting in less dryer time.
- H-axis machines use less water and require less detergent.
- H-axis washers get clothes cleaner.

Most retailers selling h-axis machines had no specific concerns about quality, reliability, or durability. Many thought h-axis machines perform better in these areas than the traditional agitator machines. When probed for specific concerns, a few retailers who sold h-axis machines listed water leakage around the door, a higher number of services calls, and worry that h-axis machines would not last as long as agitator machines.

Three primary negative perceptions of existing h-axis machines also emerged from retailers' overall impressions:

The machines are currently too expensive. The expense of the machines was mentioned several times throughout the retailer interviews as a negative aspect of h-axis machines. The general consensus was that h-axis machines are significantly more expensive than agitator models, and the benefits of the h-axis machine do not justify the extra cost.

H-axis machines are very heavy. There is a perception among some retailers that h-axis machines weigh more than agitator models. This perception results in h-axis machines being viewed as "clunky" and "cumbersome."

The tub size is small. Many retailers, like consumers, perceive h-axis washing machines as having smaller tubs that hold fewer clothes per load. This perception results in some retailers doubting the potential energy, water, and detergent savings because they think the smaller tub size would require more washloads for the same amount of laundry than agitator models.

Retailers who did not sell h-axis machines worried about quality, reliability, or durability. Most of these retailers said their concerns were attributable to never having sold h-axis machines or stemmed from hearing various types of customer feedback. Many of these retailers thought that if h-axis washers were made by a well-known manufacturer and had a good warranty, they would not have any problems with selling or servicing the machines.

Although retailers could identify potential problem areas, many were also positive and enthusiastic when asked what business opportunities would be available from selling h-axis washers. These interested trade allies were attracted to h-axis washers primarily because of the excitement the washers would generate in the product category. They viewed the current washing machine market as unvaried in terms of the range of types of machines and features that were available to consumers. Selling h-axis machines was viewed as something different that could potentially add excitement to the industry.

However, other retailers did not think that selling h-axis machines would (or did) bring any opportunities to their organization. Reasons included that h-axis machines are not asked for very often by customers, and that the machines are too expensive. This latter issue of price was frequently tied to trade allies' assessments of future sales opportunities.

All the manufacturers interviewed in this research thought there was some degree of opportunity in manufacturing h-axis machines. Manufacturers said that producing h-axis machines would be advantageous to them because they could offer customers a new product, a better product, and an energy-efficient product.

PRICE

The market for washers is segmented to some degree on price and quality, with each manufacturer positioning some brands at the higher price ranges and other brands at the lower range. Typical prices for washers range from $200 to $500. Key price points for this market appear to be under $300 (low-cost brands), $300 to $400 (economical but good quality brands), $400 to $550 (for the full-featured models and the higher quality brands targeted at the upscale mass markets). Then there are a few niche segments where specialty and extremely high quality machines are positioned. Current h-axis washers are mostly positioned in these high- cost niche segments. New models appear to be aiming at a price target of around $1,000, while existing models have typically sold in the $1,000 to $2,000 range.

Retailers' greatest concern regarding selling the h-axis machine was its potentially high price. Results from the interviews consistently indicated that trade allies (manufacturers, distributors, and retailers) view consumers of washing machines as being price-sensitive. Twenty-nine of the 50 retailers interviewed said that they were concerned about the cost of the machines. This concern was mentioned by 12 of the 15 retailers who were currently selling the machines and 17 of the 31 who were not.

Most retailers said the price of h-axis machines would have to be very competitive with traditional v-axis agitator-style machines in the future. Many thought their customers might pay 10 to 20 percent more. Some retailers named an actual amount customers might pay, which ranged from $30 to $200 more. None of the retailers felt that h-axis machines would be competitive as a high volume mass market product unless the price was fairly comparable to v-axis machines.

Manufacturers also said that the price of h-axis machines is a big concern. In their view price is the main reason European h-axis machines have not had a bigger impact on the U.S. washing machine market. Low price seems to be a strategy U.S. manufacturers have used to keep imported machines out of the U.S. Manufacturers indicated that an h-axis machine would have to be priced very similar to a v-axis machine to result in substantial mass market sales volume.

From the customer perspective, most in-home participants expected h-axis washers to cost more than v-axis washers, because of their newness and efficiency, but many were surprised or disappointed by the extent of this price differential (i.e., $600-$800 vs. $350 - $550). The information about the higher cost of h-axis washers led some in-home participants to reevaluate their interest in buying an h-axis washer. While 46 percent of in-home participants preferred the h-axis washer to their own after trying the machine, only 22 percent said they would be extremely or very likely to buy one.

Many in-home participants said they would need hard facts on the efficiency/savings, repair history, and life span of h-axis washers before paying more for this type of washer. Still, some participants - all of whom liked the h-axis washer by the end of the in-home trial -- did not need such proof and already believed the higher price was justified.

Demonstration center respondents were fairly evenly split between those who said the higher purchase price would be a big deterrent to buying an h-axis washer, and those who said it might be worth paying more if the savings, superior performance, and reliability of h-axis washers were proven.

PURCHASE INTENT

One way to assess the near-term market potential of a product is to ask research participants whether they are considering purchasing a new unit in the near future and whether they would specifically consider the product in question.

According to the market research survey, 17 percent of households either definitely or probably "intend" to purchase a new washing machine in the next two years. This translates to about 16.4 million households in the United States (or about 8.2 million per year). While not all customers who intend to buy will actually buy, this provides a reasonable upper bound for likely sales. About 7 percent of demonstration center participants reported they were actively looking for a new washer. However, a much larger portion thought they would be buying a new washer in the next two years; in fact, one-third said they were extremely likely or very likely to be in the market. In-home interview participants were generally not in the market for new washers; only 16 percent were extremely or very likely to buy a new washer in the next two years.

While a sizeable segment of consumers will be shopping for washers over the next two years, only 0.4 percent of households with washers report that they "probably will buy" or "definitely will buy" an h-axis washer in this time period. This translates into approximately 385,000 units over two years.

A major reason for the low intention to buy is awareness. In the market research survey, only 25 percent of respondents were aware of h-axis machines in residential settings. In the focus groups, very few participants mentioned h-axis washers when asked to describe the different types of washers currently available. Participants in the demonstration center and the in-home interviews had a higher level of awareness of residential h-axis washers. Thirty-two percent of demonstration center respondents and 45 percent of in-home interview participants had heard of residential h-axis washers, although these included old-fashioned (e.g., Bendix), or European machines.

The demonstration center and in-home interviews illustrated, however, that as awareness of h-axis washers increases, intention to purchase these washers also increases. The number of demonstration center respondents who said they were extremely likely or very likely to buy an h-axis washer more than doubled during the course of the interview. At the start, less than a third of respondents (28 percent) said they were extremely or very likely to buy an h-axis washer (13 percent and 15 percent, respectively). By the end of the demonstration and trial period, over two-thirds of these participants (67 percent) said they were either extremely or very likely to buy an h-axis washer (33 percent and 34 percent, respectively).

In-home interview participants also significantly increased their interest in using h-axis washers after use. Prior to use, one-quarter of in-home interview participants were extremely likely or very likely to buy an h-axis machine. One-fifth were somewhat likely to do this and one-half said they would not buy an h-axis washer. In contrast, nearly half of participants (46 percent) said they preferred the h-axis washer to their own machine at the end of the 6-week trial. However, these preferences for the h-axis machine did not always translate into a strong willingness to buy one, especially once people became aware of the $600 to $800 purchase price.

POTENTIAL ENERGY AND WATER SAVINGS IMPACTS

From the utility perspective, understanding the potential energy and water savings from h-axis machines is critical to determining levels of support for the technology. A major goal of the THELMA research was to develop estimates of potential savings under "real life" conditions. The impact analysis measured water savings, hot water energy savings, dryer savings, and whether people would change the size of their wash loads or water temperatures. This analysis also estimated how much resource savings the consortium utilities could realize if h-axis washers penetrated 5 percent or 10 percent of the residential washing machine market.

To measure savings, the 50 in-home participants' existing washer and dryer were monitored for a 6-week period. Then an h-axis washer was substituted for the v-axis washer. The h-axis washer and dryer were then monitored for a 7-week period. The extra week in the h-axis monitoring period allowed participants to adjust to the new washer. Two different types of h-axis washers were used for this research. Washer A was installed in 46 of the 50 sites. It is a front-loading model that was officially released to the U.S. market in September 1996 by a major U.S. appliance manufacturer. Washer C was installed in 4 of the 50 sites. It is a front-loading model manufactured in Europe and available in the U.S. Washer C requires 220 volt service and only a cold-water connection because it has an internal electric water heater. Table 2.4 presents additional features of these two machines.

Table 2.4: Features of H-Axis Washers Used in the In-Home Monitoring Task

Feature	Washer A	Washer C
Loading location	Front	Front
Basket volume, ft^3	2.6	1.4
Wash temperature options	hot/cold warm/cold cold/cold warm/warm	variable/cold
Number of cycle options	4	6
Extra rinse or high rinse option	yes	yes
Small loads/low water feature	no	yes
Spin speed, rpm	650	1000
Other features		internal water heater

At one site the participant misused the h-axis washer throughout the monitoring period by only running a prewash cycle and not following it with a normal wash. H-axis data for this site are excluded from the analyses.

Load Size Changes

Before reviewing the water and energy savings it is important to examine whether load sizes changed. A significant finding from the field test related to water and energy impacts is that participants in the field monitoring did not appear to significantly change the size of their laundry load between the v-axis and h-axis washers. As noted previously, a key concern among consumers and trade allies is that there may be very limited energy and water savings. They reasoned that although customers will use less energy per load, they will have to do more loads to complete their typical laundry. This concern grows out of the fact that the drum size for the h-axis machines looks smaller than the usual v-axis machine. Manufacturers and current owners of h-axis point out that this difference is just a perception, and once customers get use to stuffing an h-axis machine full, they do about the same amount of loads.

In the in-home test, this was generally substantiated. Participants in the test used a calibrated laundry basket to gauge the size of both their v-axis loads and h-axis loads during the test period. On average, participants with h-axis Washer A reduced their load size by 4 percent

and participants with h-axis Washer C reduced their load size by 10 percent. The most significant change for a single household was a 25 percent reduction in load size for the h-axis washer and, according to the consumer research, this participant believed that the washer (Washer A) was not as large as her v-axis washer. It was also found that people do not significantly change the wash temperatures between the v-axis and h-axis washers.

Water Savings

H-axis machines save water. Water savings ranged from 11 to 74 percent per load over the existing v-axis washer for the 50 in-home participants. The average water savings was 36 percent. In terms of gallons of water per load, the average v-axis water usage was 39.5 gallons per load and the average h-axis water usage was 26.2 gallons per load for Washer A and 13.4 gallons per load for Washer C. The average difference in water consumption for all 50 households is approximately 14.6 gallons per load. Assuming a typical household does 6.7 loads per week the total annual water savings would be about 5100 gallons of water.

The data also show that the water savings per load could potentially vary substantially depending on the machine. As shown in Table 2.5 below, h-axis Washer C saved almost 22 gallons per load over the v-axis washer, while Washer A saved 14 gallons. These results must be interpreted cautiously because only a very small number of Washer Cs were monitored, but the difference still point to the fact that there may be substantial variability among types of h-axis machines. These differences could result from washer design, tub size or variability of water level selection. In this case the difference is likely due to washer design because the tub sizes are fairly similar and there is no water selection capability available on these machines.

Table 2.5: Water Savings (gallons/wash load)

Washer	# of Sites [1]	Maximum	Minimum	Mean	@ 90 % CL [2]		Standard Deviation
All Participants	49	30.1	3.9	14.6	13.3	16.0	5.8
H-axis Washer A	45	26.6	3.9	14.0	12.7	15.3	5.3
H-axis Washer C	4	30.1	13.5	21.6	16.1	27.2	6.8

[1] Participant that misused Washer A is excluded.
[2] Confidence interval at the 90% confidence level
* Source = Impact Analysis

Energy Savings

The results for energy savings are somewhat more complex to explain. Total energy savings per load of wash for a participant household is linked to two key variables: (1) if warm or hot water is used for washing (energy is saved in heating water) and/or (2) if the washer features a high-spin speed that decreases the residual moisture content (thereby saving energy in the dryer because of less drying time). The study results indicate that the energy savings attributable to the washer's motor are insignificant.

On average, for the 50 participant households, the water heating energy savings expressed as electricity savings is 1.02 kWh per load and the dryer energy savings is .23 kWh per load. Therefore, total energy savings is 1.25 kWh per load on average. If the typical family does 6.7 loads per week, an average household could expect to save about 436 kWh in hot water and dryer savings per year. The results of the study suggest however that savings may differ among households depending on the water temperature settings they use and the type of machine they have. Each of these is discussed briefly below.

First, in terms of water temperature used in washing, the magnitude of energy savings strongly depends on how often hot water is used for laundering. This can be illustrated by examining the energy savings associated with the more extreme cases that used primarily hot/warm washes and those that used primarily cold washes. There are five households that used primarily hot/warm water. Specifically, these five participants selected hot/warm, hot/cold, or warm/warm for their wash/rinse temperatures more than 50 percent of the time during the v-axis monitoring period. These participants saved nearly 1.9 kWh per load using the h-axis machine (Table 2.6). There are four households that chose mainly cold washes, they selected cold/cold more than 75 percent of the time. This group of participants saved very little energy with the h-axis machine, only .26 kWh per load. This number is not significantly different from zero at the 90 percent confidence level. In essence there were no statistically significant savings for cold water users. The remaining participants represent "mixed" wash temperature settings. These customers used a mix of hot and cold washes. Their average energy savings was .98 kWh per load.

Table 2.6: Hot Water Energy Savings (kWh/wash load)

User Type[1]	# of Sites[2]	Maximum	Minimum	Mean	@ 90% CL[3]		Standard Deviation
All	47	2.451	-0.230	1.02	0.878	1.163	0.595
Hot	5	2.451	1.115	1.899	1.425	2.373	0.646
Mixed	38	1.892	0.085	0.984	0.871	1.097	0.424
Cold	4	1.418	-0.230	0.266	-0.370	0.901	0.774

[1] Hot users selected hot/warm, hot/cold, or warm/warm more than 50% of the time. Cold users selected cold/cold more than 75% of the time.

[2] Two sites with malfunctioning v-axis washer water valves and the misused Washer A site are excluded.

[3] Confidence interval at the 90% confidence

* Source = Impact Analysis

Second, the h-axis washers also save energy by lowering the drying time and thus the amount of energy used by the dryer. This can be seen by comparing the dryer savings for the two h-axis washers tested. In the in-home test, Washer C had a higher spin speed than did Washer A. The results (Table 2.7) indicate that average dryer savings for Washer A households were only .075 kWh per load, an estimate that again is not significantly different from zero. The dryer savings for households with Washer C were 1.784 kWh per load.

These results suggest that if the h-axis washer has a high speed spin cycle, dryer energy savings can be greater than the hot water energy savings (Washer C dryer savings is 1.784 kWh per load, while the average energy savings for customers using mixed water temperature settings is about 1 kWh per load). These conclusions must be interpreted carefully because the ratio of hot to cold loads is not identical between the Washer A households and Washer C households, but even with statistical controls the effect of dryer savings of Washer C is significant.

Table 2.7: Dryer Energy Savings (kWh/wash load)

Washer	# of Sites[1]	Maximum	Minimum	Mean	@ 90% CL[2]		Standard Deviation
All Participants	45	2.78	-0.76	0.23	0.05	0.40	0.72
H-axis Washer A	41	1.78	-0.76	0.08	-0.06	0.21	0.51
H-axis Washer C	4	2.78	0.99	1.78	1.18	2.39	0.74

[1] Two gas dryer sites, the misused Washer A site, and a site that purchased a new dryer the test are excluded.
[2] Confidence interval at the 90% confidence level
* Source = Impact Analysis

SUMMARY

This section has summarized key findings from the THELMA research components that describe the current market and marketplace dynamics. It is against the conditions described in this section that utilities will have to make judgments about how to develop effective marketing strategies. The next section discusses the marketing implications for utilities.

CHAPTER 3
MARKETING STRATEGIES

The research conducted for the THELMA project provides substantial information for planning marketing strategies aimed at increasing the saturation and purchase rate for h-axis washers. The research demonstrates that the washing machine market and the h-axis purchase decision are part of a complex set of interrelationships that include manufacturers, distributors, retailers, customers, and after-sales service providers. The purpose of this section is to summarize the key findings as they relate to marketing strategies and the role of utilities in influencing the market for h-axis washers.

MARKET SUMMARY

As noted in the previous section, the market for washing machines among households that already have washers in the U.S. is substantial. 4.7 million units were sold in 1995. The work conducted here did not include estimating sales to developers, home builders, apartment and rental unit managers, or households where no washer was currently present. AHAM estimates total washer units shipped in 1995 at 6 million.

The market for washers purchased directly by consumers is dominated by a few manufacturers selling under a few key brands. The market is extremely competitive with brands competing mainly on price, manufacturer reputation, and to some extent quality and features. The market is segmented to some degree on price and quality with each manufacturer positioning some brands at the higher price ranges and other brands at the lower range. Typical prices for washers range from $200 to $550. Key price points for this market appear to be under $300 (low-cost brands), $300 to $400 (economical but good quality brands), $400 to $550 (for the full-featured, economical models and the higher quality brands targeted at the upscale mass markets). There are a few niche segments where specialty and extremely high-quality machines are positioned.

Washers are sold primarily through large national and regional retailers that buy large volumes and negotiate directly with the manufacturers. Most machines are sold in an environment where multiple brands are present and displayed on the floor. Sales people receive varying incentives for pushing particular brands, but the availability of multiple brands in most shopping encounters allows customers to express choice.

The washing machine market has been relatively stable with regard to new products for many years. The primary innovations have been color, small features, and image-related repositioning. The market is not perceived by buyers or sellers to be particularly exciting.

Within this washing machine market, the h-axis machines have been a specialty product aimed at small niche markets. H-axis machines have been available for years, but there has been limited mass market selling. Major U.S. manufacturers have not vigorously pursued an h-axis market for a variety of reasons, but ultimately because of the lack of consumer demand.

Prior to the recent introduction by Frigidaire, the major exception was the White-Westinghouse unit that received a weak reception and considerable criticism. Otherwise sales of h-axis machines have been through European or specialty manufacturers with generally very low sales (less than 2 percent of washer sales annually). The current h-axis sales are dominated by very high priced units (generally $1000 or more) targeted at upscale consumers seeking key benefits.

The h-axis market has been changing in the past two to three years as a result of interest in potential energy- and water-savings benefits. Utilities and various energy efficiency and environmental groups have promoted h-axis as a means of lowering customer energy and water bills and generating environmental benefits. These efforts have included collaborative efforts like THELMA and the Consortium for Energy Efficiency (CEE), national h-axis washer programs, lobbying and participation in various standards-setting processes, and pilot efforts to conduct rebate and information programs in their service areas.

Customer Economics

In light of this market, a key issue is whether utilities should seek to influence h-axis sales. This issue will be a matter of debate. Utilities involved in this study are primarily interested in h-axis washers for the demand and conservation benefits afforded by the lower use of water, waste water, and energy. Water and energy utilities can potentially reduce demand and consequently put off large capital investments in capacity or in improvements to the distribution system if significant saturation of h-axis washers could be achieved. In addition to an emphasis on savings for capacity deferral, lower water and energy use could also have important environmental and societal benefits associated with lower resource use. Finally h-axis machines can provide a benefit to those who see potential for providing value-added solutions to customers in the form of bill control and lifestyle improvements.

The value of these benefits to any given utility will depend on their particular circumstances. Utilities with high "avoided" water/waste water or energy costs or utilities facing near-term capacity constraints may find there is significant benefit in promoting widespread adoption of h-axis washers, while utilities with lower costs may find that increased adoption is most useful for targeted applications (e.g., lowering water or energy requirements in given communities or geographical areas).

In terms of customer economics, the benefits to the customer depend on their electricity, water, and sewer rates, as well as the amount of energy and water savings they would realize. Savings are dependent on the type of h-axis machine they would purchase and their washing behaviors. Specifically, the impact analysis suggested that savings depended on the following factors:

Energy savings:

- number of loads per week washed
- use of hot or warm water settings
- use of an h-axis machine with a high-spin speed (yielding dryer savings)

Water savings:

- number of loads washed per week
- model of h-axis washer

The impact analysis from the in-home monitoring suggests that an average customer with average utility rates might be expected to save $43 to $106 per year in combined energy, water, and waste water savings depending on which h-axis machine they owned ($43 for Washer A, $106 for Washer C). This estimate assumes that the customer washes 6.7 loads per week, washes about 60 percent of their loads using warm or hot water, and that they have average utility rates ($.0835 per kWh, $.002011 per gallon for water, $.002362 per gallon of waste water).

These total dollar savings mean that the simple payback for an h-axis machine will probably range from 4 to 9 years for current technology if the incremental cost of an h-axis machine is $400 over the cost of the same basic v-axis machine. This may be about right in the current market as manufacturers are targeting the $800 to $900 range for new h-axis machines intended for the mass market. However, as the technology improves over the next few years and as prices for this technology come down, the payback period for an average customer will drop as well.

Example Calculation of Simple Payback

The simple payback scenarios follow from the engineering-based energy savings algorithms developed as part of the impact analysis. These algorithms are, in turn, based on data gathered for each of the two h-axis washer types from the in-home monitoring. The example calculation below assumes Washer C (with high spin speed) and 20 percent of loads are cold water washes (% CC). The algorithm also assumes a 60^0 hot water temperature rise (delta T). Also obtained from the in-home monitoring is a per load water savings assumption for Washer C of 22 gallons.

Energy savings algorithm with three components: washer (mechanical), hot water, and dryer.

Washer + Hot Water + Dryer

Washer C = 0.026 + 1.02 x (1 - %CC)/0.73 x (delta T/72.4) + 1.784

Example energy savings calculation:

Washer C = 0.026 + 1.02 x (1 - 0.2)/0.73 x (60 / 72.4) + 1.784 = 2.74 kWh

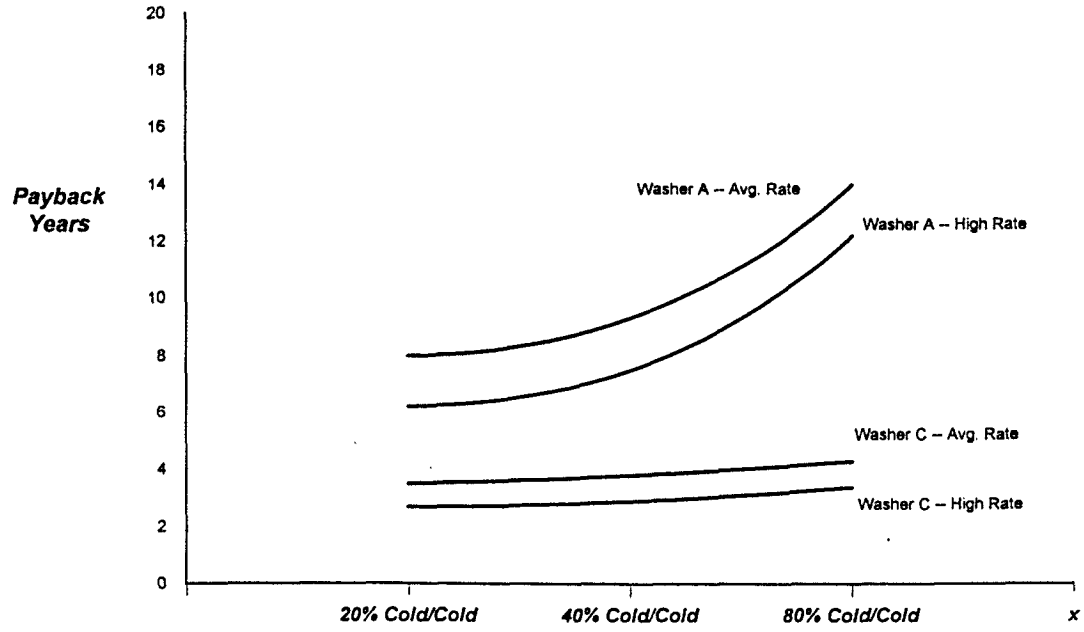
Example simple payback calculation:

This example simple payback calculation assumes an average of 6.7 wash loads per week (348 annual wash loads) and that 20 percent of loads are cold water washes (80% are warm or hot water wash loads). The example below also includes the high utility rates assumption, and an assumed incremental cost for the h-axis washer of $400.

Per load electricity savings	=	2.74 kWh (washer + hot water + dryer)
Annual electricity savings	=	953.5 kwh
Per load water savings	=	22 gallons
Annual water savings	=	7,656 gallons
Annual electricity savings ($)	=	$114.61 (953.5 kWh @ $ .1202 per kWh)
Annual water savings ($)	=	$16.84 (7,656 gallons @ $ .0022 per gallon)
Annual sewer savings ($)	=	$18.17 (7,656 gallons @ $ .002373 per gallon)
Total annual savings ($)	=	$149.62
Simple payback	=	2.7 years ($400 / $149.62)

While the payback period for an "average" customer is 4 to 9 years, it is also important to recognize that the payback can vary considerably depending on several key factors including number of loads per week, washing temperature used, and washer spin speed. Figure 3.1 and Figure 3.2 illustrate these key conditions. Figure 3.1 shows the payback for each of two machines (Washer A and Washer C) using two assumptions about rates (average and high[1]) across the use of different water temperature settings.

Figure 3.1: Effect of Washing Temperature Settings on Payback Period ($400 Incremental Cost; 6.7 loads per week)

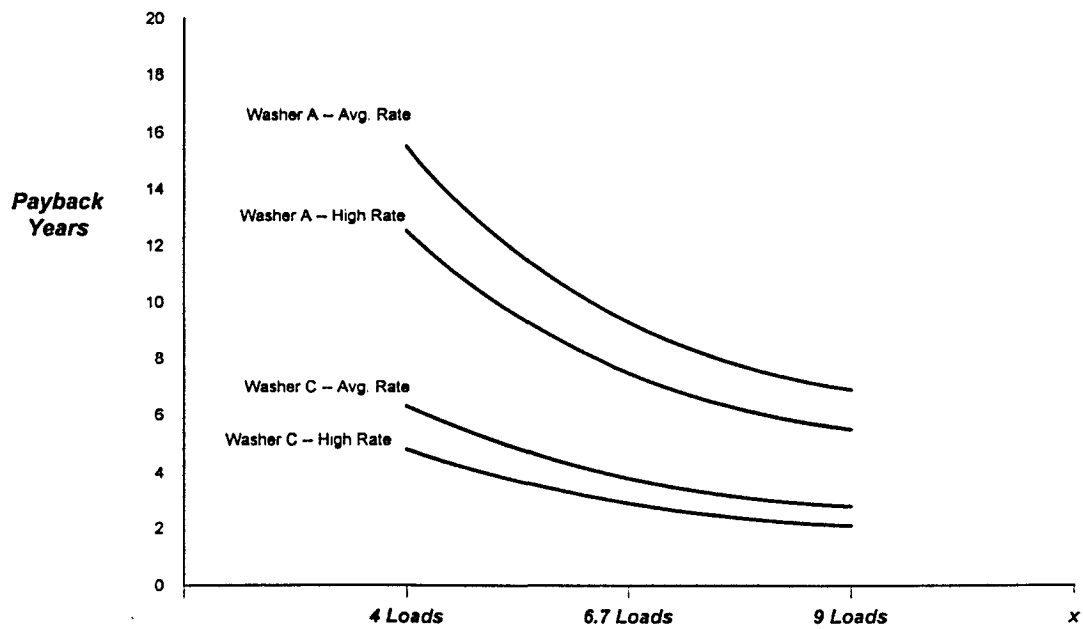


Source = Impact Analysis

[1]$.0835/kwh was used as the average electric rate and $.120247/kwh was used as the high electric rate. Source: "Monthly Electric Utility Sales and Revenue Report with State Distributions" Form EIA-826. Data Year 1995 (DOE/EIA). $.002011/gallon was used as the average water rate and $.002171/gallon was used as the high rate. $.002363/gallon was used as the average waste water rate and $.02373/gallon was used as the high waste water rate. Source: "Raftelis Environmental Consulting Group, "1996 Water and Waste Water Rate Survey."

Overall the chart shows that the more cold washes that are done, and the lower the rates are the longer the payback period. However, the higher the spin speed the shorter the payback period. Specifically, Washer C has consistently low payback across different water temperature levels. This is the machine with a high spin speed so most of the energy savings are in the dryer savings. Dryer savings do not vary much by the water temperature being used. In contrast, the payback for Washer A varies substantially and is quite sensitive to whether the customer is washing with hot/warm water or mostly with cold water. Customers who wash primarily in cold water have a long payback (as much as 12 to 14 years) because the energy savings is primarily from heating water and no water is being heated if cold wash cycles are used.

Figure 3.2: Effect of Number of Loads per Week on Payback Period ($400 Incremental Cost)



* Source = Impact Analysis

Figure 3.2 shows a similar comparison but the number of loads per week is varied instead of the water temperature settings (for water temperature this chart assumes everyone is washing about 40 percent of their loads in cold/cold water which is the national average across all loads). This chart shows that for both Washer A and Washer C, the payback time is substantially reduced if the household does more laundry.

Overall, the payback analysis suggests several key findings in terms of trends in h-axis technology and marketing of h-axis machines:

- Payback will vary by laundry behavior--consumers who do fewer loads and primarily use cold water may have relatively low bill savings depending on the type of machine they buy.

- Payback will vary by machine--In this test, only two different types of machines were tested but the results show that variations in the actual water used for washing, and the residual moisture content and resultant dryer energy savings, were large enough to significantly affect bill savings. As the number of technologies in the marketplace increases, customers seeking bill savings will need to be directed to machines that will result in savings in their particular circumstance.

- Payback will vary by rates. Obviously local utility rates can substantially affect potential bill savings. Utilities with high rates will be in a better position to demonstrate bill savings to the consumer.

- Payback will vary by incremental costs. The analysis here assumed an incremental cost of $400 for payback calculations. As the cost differential between v-axis and h-axis machines declines, the payback will improve. For example, a customer saving $60 per year in combined utility costs would see the payback drop from 6.7 years if the incremental cost is $400 to 3.3 years if the incremental cost is $200.

An alternative perspective on the customer economics of using h-axis versus v-axis washers is shown in Table 3.1. Impact analysis results were used to estimate the annual costs of using an h-axis washer over a 16-year service life. As with the simple payback examples, assumptions for a typical consumer are: 6.7 wash loads per week, 40 percent of loads using cold/cold temperature setting, and $400 and $800 initial purchase costs for v-axis and h-axis machines, respectively. These annual costs include the purchase price and utility costs (electricity, water, and waste water). They reflect two utility rate scenarios: high and average. Installation and maintenance costs are not included. According to the market research survey, most washers are replaced by the time they are 16 years old. Therefore a 16 year service life was used for these comparisons.

Table 3.1: Estimated Annual Costs for V-Axis and H-Axis Washers[1]

Type of Washer	High Utility Rates	Average Utility Rates
V-Axis	$281	$219
H-Axis (Washer A)	$242	$195
H-Axis (Washer C)	$168	$137

[1]Annual costs for 16-year service life
Source: Impact analysis

The results in Table 3.1 indicate that either h-axis washer (A or C) has lower annual costs than a v-axis washer under either utility rates scenario. The annual costs for the v-axis machine range from $281 (high utility rates) to $219 (average utility rates), compared with $242 and $195 for Washer A, and $168 and $137 for Washer C. This represents a 40 percent savings for Washer C annual costs in the high utility rates example (compared to the v-axis), and 37 percent savings assuming average utility rates. The comparable savings for h-axis Washer A are 14 percent in the high utility rates scenario, and 11 percent in the average rates example.

As with the simple payback calculations, it is important to recognize that several key factors can influence annual costs. However, if the number of wash loads per week increased, if proportions of warm or hot water washes increased or if utility rates were higher, the annual costs savings for the h-axis machines would be even more evident. If the washer service life exceeds 16 years and/or the incremental costs of the h-axis washers decrease, even more dramatic savings in annual costs can be realized.

Marketing Strategies

Against the market and customer dynamics described earlier, the THELMA participants seek to develop programs that can increase the saturation of h-axis washers. The current market presents many barriers to widespread adoption at all levels of the distribution system. This research has identified the following key barriers:

- Lack of product from a major ("trusted") U.S. manufacturer
- Manufacturer reluctance to invest in a product with untested consumer demand
- Price
- Low consumer awareness of the technology and the potential benefits
- Low retailer awareness and lack of incentive to sell

The goal of any marketing or market transformation programs will be to overcome these key barriers if increased adoption of h-axis is to be achieved. In some cases the barriers are

already being addressed, changes have been made, and these changes need to be supported. In other cases, the barriers have been inadequately addressed and additional initiatives are needed.

The THELMA research suggests numerous key elements in building a successful marketing strategy to support h-axis adoption. Strategies will vary among utilities depending on the size of the customer base (and therefore the number of washer sales), the utility's willingness to participate in larger joint marketing initiatives, and local market factors. In general, to achieve widespread adoption in a mass market, utility marketing strategies will need to:

- Address manufacturers, distributors and consumer levels of the product distribution channel to yield maximum marketing success
- Build on collaborative efforts to leverage dollars and impact across markets

The purpose of this section is to review key findings and provide recommendations for marketing strategies based on the results of the THELMA research. The discussion is organized around strategies to influence customers and to influence trade allies (dealers, distributors, and manufacturers).

CUSTOMER-BASED MARKETING STRATEGIES

The current market for h-axis washers is a relatively small proportion of overall washing machine sales. Manufacturers have been hesitant to push h-axis technology in the U.S. because of perceived customer resistance and cost issues. A key goal of any h-axis marketing strategy for utilities is to engage in a series of activities that will create customer demand. Manufacturers will meet the demand if they believe it is there.

At the customer level, there are substantial information barriers that must be overcome. Simple awareness of the technology is low, and there are many concerns and misconceptions to address. The research clearly shows the current marketplace is not well prepared for these washers; consumers have little pertinent knowledge of h-axis machines. They are also fairly satisfied with the machines they have now and need to have good reasons to switch. Finally, consumers are often immediately concerned about two aspects of the h-axis washers that were tested in this study: the more difficult access to the washer and its assumed smaller capacity. Still, participants often warmed to these machines once they learned more about them and had a chance to try them out. Utilities will need to increase general awareness and manage the information in the sales process to prepare the market for more rapid adoption of h-axis machines.

Based on the research, there are five marketing imperatives for customer-level strategies. These include:

- Increase awareness
- Answer questions
- Describe the benefits
- Target audiences
- Address price

Each of these areas is discussed below.

Increase Awareness

General Awareness. At the first level, the majority of customers in the market for a washing machine are unaware of h-axis technology for residential use. Most in-home interview participants said raising awareness of h-axis washers was crucial because people knew so little about them. Further, the research showed that many customers are not aware of the potential benefits of the technology. Thus, it will be critical to begin the market conditioning process by diffusing information that highlights both the existence of the technology and its key benefits to customers. Participants in this research strongly supported utilities providing this type of information. Utilities could use bill stuffers, stories in relevant newsletters, sponsorship of trade events, news coverage, and other forms of general media exposure. As found in the demonstration center, it would be important to inform people on the following topics:

- details of purchase price
- examples of typical operating costs
- proven data on reliability, water, and energy savings
- proven data on cleaning, rinsing, wear and tear
- guidance on capacity

Customers also supported the idea of demonstrations to help further increase the general understanding of h-axis technology. This could be accomplished through permanent or mobile demonstration set-ups, support for demonstrations at home shows, appliance events, parade-of-homes sites, and related technology demonstration events. Demonstration center respondents were enthusiastic about demonstrations because their own experience had been positive. However, many cautioned that although "seeing is believing," it would be difficult to get people to stop and spend the time to watch or participate in a demonstration unless they were actually in the market for a new washer. Most in-home interview participants felt it would be difficult to get people to attend demonstrations even though this was a good way to introduce them to h-axis washers. The idea of demonstrations received lower ratings among these participants than among demonstration center respondents, probably because the in-

home interview participants had just experienced a seven-week "demonstration" in their own homes.

Managing the Information Exchange at Point of Purchase. While general awareness campaigns are needed to build basic understanding, increasing the likelihood of buying will also require improving the flow of information at time of sale. Several in-home participants noted they would not read such general information unless they were in the process of buying a new washer. Similarly, demonstration center respondents also said they would be unlikely to read direct mail about h-axis washers unless they were currently in the market for a new washer. Thus, it will be critical to reach customers who are in the market at the time they are evaluating their options. This means focusing on events where potential buyers gather--at the point of purchase.

While it will not be possible to simulate a seven-week washing experience in appliance stores, thought needs to be given for ways to simulate such an experience. What combination of factual information, test washes, testimonials, and visual media will make the unfamiliar become familiar within a 30-minute appliance store visit?

Some key ideas, based upon the consumer research findings are:

- Make the name of this type of washer friendly and familiar (e.g., tumble action, not h-axis)

- Make sure h-axis machines are visible. Distinguish them from their v-axis counterparts by providing special placements and display. Emphasize that they are new and exciting--not that they are just the "old" technology hidden in the back.

Answer Questions

Consumers have little real knowledge of or experience with h-axis washers for home use, although many are familiar with laundromat machines. The information needs of consumers are significant and multi-faceted. Consumers want in-depth, objective, over-time evidence based upon the experience of real people. They want answers to tough questions such as: If I fill the machine to capacity, how clean will my wash get? and What will I really save, in my household, given my laundry habits?

Although many demonstration center participants were open-minded about h-axis washers and warmed appreciably to them throughout their interview session, they still asked for proof that tumble washers were at least as good as their trusty v-axis washer. Armed with proof, and buoyed by added h-axis benefits (e.g., water and energy savings), they may consider switching. Helping consumers leap past the barriers they immediately see, primarily smaller

capacity and access issues, and helping them believe h-axis washers offer viable benefits will take the right combination of words, pictures, hands-on experience, word-of-mouth, and hard evidence.

Based on the research, the following suggestions will help utilities answer the key questions:

- Assume that consumers know very little and will have many questions--develop frequently asked question (FAQ) sheets for distribution and prepare sales people.
- Encourage customers to load and unload h-axis washers, so they can test access and capacity issues.
- Allow customers to see the tumble action and explain what is happening. This will demonstrate how clothes "shrink down," how gentle the action is, how clothes get cleaner, how less water can be used.
- Have testimonials from regular people explaining their preferences for - and adjustment to - h-axis washers.
- Provide clear, documented evidence of water and energy savings, cleaner clothes, less wear and tear.

To be an effective marketing "hook," the concept of efficiency needs to be reframed. Findings that consumers are concerned with washer efficiency are encouraging. At this point, however, people feel *they* are responsible for washer efficiency, not the machine. They already feel they use their machines efficiently by choosing the correct water levels and water temperatures. This is efficient behavior which many utilities have promoted for years.

But behavioral efficiency is different from technical efficiency. Many participants did not appreciate or were confused by this new type of efficiency and how it would affect them. They will ask themselves, quite rightly, *Why should I be concerned about efficiency when I'm already efficient?* Once they understand the machine actually operates differently and thus makes more efficient use of water and energy, they will wonder if an h-axis machine could save energy and water compared to how they use their v-axis machine. Direct comparisons or case studies would help consumers understand this information.

These are legitimate questions and the answers are not clear-cut. If a household with an extra-large capacity v-axis machine does full washes with mostly cold water, how much water and energy are they likely to save with an h-axis washer? Will people conclude that h-axis washers offer them more choices - i.e., more warm and hot water washes for the same

operating cost? If machine efficiency is to be effective as a marketing "hook," it will need to be explained and differentiated from user-controlled efficiency.

Describe the Key Selling Benefits

Several key customer benefits appear to be engaging and potentially offer "triggers" for selling. Based on the research, key benefits that distinguish h-axis from v-axis include:

- gentler to clothes
- superior cleaning
- shorter drying time
- environmentally friendly
- water savings
- energy savings
- higher quality machines
- space saving designs
- brand recognition and trust (for European models)

Various manufacturers of brands of h-axis machines claim these benefits to a greater or lesser degree. Each of these benefits is sought by some segment of customers. Current h-axis marketers have positioned their product in the marketplace based on their assessment of the competitive advantage they can claim based on these key benefits.

Utility marketing can support these benefit claims by additional efforts to make customers aware of the benefits and by legitimizing manufacturer claims (where appropriate). Importantly, utility marketing can focus on helping customers understand not only what the benefits are, but how to realize them. This is especially true of bill saving where the size of the bill saving will depend on the number of loads washed, the mix of hot and cold loads, and the presence of a high spin speed. Manufacturers and retailers may over-promote key benefits without alerting customers to conditions under which they may not have bill savings. Utility promotional materials can alert customers to the conditions under which they are most likely to experience the benefits.

Target Audiences

Overall, any marketing effort should target women and address their concerns in the purchase process. Convincing women will be crucial to transforming the washing machine marketplace. THELMA research findings show that women have a critical role in washing machine choices. They are responsible for doing the laundry in two-thirds of the U.S. households. In addition, they are much more likely than the men in the household to be involved in both shopping for and purchasing a washing machine. Laundry rooms are likely to be their distinct purview, and they think hard about what they need in a washer. If men are

involved in the decision, it appears (and this is based upon other appliance studies) that their input is likely to be focused primarily on financial considerations. Obviously, financial considerations are important, but they are not the only factor.

It is important to assume that women and men may have different perspectives on washing machines. Outreach methods and materials need to reflect women's perspectives and to respect their lead role in decision making. The materials will also need to satisfy any men involved in the decision making. It would be prudent to test any outreach materials with groups of women and men to make sure the materials strike the right chord.

The market can be further segmented by key benefits sought. As noted above, the research suggests that many customers see potential benefits in h-axis washers that appeal to them (e.g., superior cleaning, water savings, etc.). However, given the likely higher-than-average cost for h-axis machines, key target audiences will be buyers who are willing to pay extra for these benefits. This means targeting audiences who express these needs and who have higher levels of discretionary income. In the market research, customers in the annual income range of $40,000 to $75,000 expressed stronger interest in h-axis machines, as did customers with higher education levels. Retailers who sell the machines describe the market segments that h-axis machines might appeal to as:

- People who are interested in ecology or the environment
- People who have space limitations
- People who want to conserve water, including customers with wells/septic systems
- People who want to lower their energy costs
- Upper-income people
- Europeans or people who have used the machines before
- People in their mid-30s or older
- People who want a better quality machine

These audiences can be targeted in a variety of ways including choosing media channels with the appropriate demographic profile, tailoring the messages in mass media to highlight these key benefits, and developing trade ally relationships with dealers that target these groups.

It is also important to note that new segments will emerge with increasing saturation. Not all of the test participants sought the key benefits noted above. For example, some participants liked how quiet the machines are. Customers seeking quieter washers may evolve into a key segment as people become increasingly aware of this benefit.

Pricing

The biggest barrier to mass market adoption of the h-axis washers at present is price. Customers indicated in a hypothetical choice analysis that if price were equivalent, they would choose the h-axis technology as frequently as the v-axis. These results have to be viewed cautiously given the low levels of awareness, but they suggest that customers are interested in the benefits h-axis provides if price is not an issue.

Price is, however, an issue. Most retailers indicate that they will have great difficulty selling the machines if they are more than 10 to 20 percent higher than current machines. In-home test participants showed a strong interest in having h-axis technology after the test, but many baulked at the high price (estimated at $800).

Given the price issue, increased saturation can be achieved in two ways. First, utilities can work with trade allies and manufacturers to more effectively target customers who are willing to pay extra for these benefits. Clearly the success of some very expensive models suggests that there are customers in the market willing to pay a premium for h-axis washing benefits, but these are niche markets and need to be carefully targeted. This would be a useful strategy if the goal is to increase purchase rates from the currently very low rates of 1 to 4 percent of all washing machine purchases to 10 to 20 percent.

Second, utilities can specifically address the price issue by providing various forms of subsidization. These could include rebates, financing, dealer spiff programs or stocking incentives, or manufacturing incentives. Among demonstration center and in-home participants, rebates received the most enthusiastic response, while the low interest loans were the least popular approach. When asked why they rated rebates as they did, demonstration center respondents often remarked that the extra money was an incentive, although the money alone would not convince them to purchase a new, different machine. While in-home interview participants agreed that money alone would not convince people to buy an h-axis washer, they felt rebates might coax people to take a closer look at this new type of washing machine. Participants were also asked how much the rebate would need to be to be effective. The vast majority of participants felt that a rebate would have to be $100 or more to be effective.

Given the current environment of declining direct rebates to customers, approaches that use a combination of financing, dealer incentives and cooperative relationship with trade allies (such as cooperative advertising) may be the most appropriate types of subsidization.

Although rebates are obviously an important factor in influencing customers to purchase h-axis machines, they are not the only answer. It appears clear from the research that increased saturation could be achieved without substantial direct incentive payments to customers.

Increasing awareness, knowledge of benefits, and targeting customers who are willing to pay extra for key benefits would increase sales.

TRADE ALLY MARKETING STRATEGIES

Most manufacturers and retailers thought that utilities could be effective partners in the marketing process. Utilities provide credibility and are a potential source for information about h-axis washers. Most trade allies felt that a combination of rebates, advertising, and education to help promote energy-efficient clothes washers would be effective. At the same time, trade allies are somewhat wary of utility programs. They stock and sell based on historical patterns, and utility programs could alter those patterns. Further, utility support for these programs is often fickle and makes long term planning difficult. This leads to uncertainty about ordering decisions and increased risk in the form of inventory that may or may not sell.

Retailer Strategies

Increasing awareness. Many retailers are unaware of h-axis machines. Other retailers have old associations with White-Westinghouse and Bendix machines that need to be changed. Educating retailers will be a valuable tool in helping to inform consumers at the point of purchase of the benefits of h-axis machines.

Utilities can increase awareness among trade allies by sponsoring dealer trainings that address the key selling benefits of h-axis washers and identify the most likely target audiences. If utilities arm retailers with the tools necessary to reach these target audiences then consumer awareness will increase, the demand for h-axis machines will increase, and manufacturers will respond.

Targeting trades. Some retailers interviewed in this study sell to specific customer segments (e.g., the "green" market) that are more likely to consider purchasing h-axis machines. Targeting these trades with dealer training, incentives, and point-of-purchase materials will give utilities a direct link to key customer segments.

H-Axis stocking. The majority of retailers reported that they stock most of their v-axis machines. H-axis stocking, however, is mainly restricted to one or two floor models. Utilities could increase h-axis visibility by offering retailers stocking incentives. Retailers also recommended that purchasing h-axis floor models could be an effective marketing strategy for utilities. This would allow customers to see and actually use the washers without retailers having to take the risk of investing in a machine that did not have a proven sales record.

Manufacturer Strategies

As noted previously, manufacturers have had limited interest in h-axis machines in the U.S. market. As a result of increasing utility interest, standards-setting processes, and collaborative efforts, manufacturer interest is increasing. Currently several manufacturers have either introduced or have plans to introduce efficient washer technologies. These efforts will overcome a key barrier--the lack of a product by large trusted U.S. manufacturers. Additional efforts will be needed to continue progress toward mass adoption.

Establishing relationships with U.S. manufacturers. It will be necessary for utilities to work cooperatively with big U.S. manufacturers because of the importance of brand reputation in the washing machine purchasing decision. Most retailers felt that if a strong U.S. manufacturer was behind an h-axis machine then the machine would sell. A few retailers felt that h-axis promotion by manufacturers, not utilities, would be key to h-axis success.

> *"I don't think utilities are the key. A major manufacturer needs to put their weight behind it. If a GE or a Whirlpool said the product was good, I would believe them, not the utility."*

All the manufacturers interviewed for this project thought the market for h-axis machines was a growing niche market. The most effective marketing strategy will be realized if utilities and major U.S. manufacturers can pool their resources to help the h-axis market reach its full growth potential.

Encouraging DOE to implement standards. The Department of Energy is required by the National Appliance Energy Conservation Act to establish and periodically revise conservation standards for consumer products. DOE is currently considering whether to issue new energy-efficiency standards for washing machines. It is possible that a new standard will be set for 2001 that could only be met by horizontal-axis washing machines.

Encouraging DOE to implement stricter efficiency standards is a politically sensitive area, but it works. Manufacturers have spoken out in this research and in trade articles about their opposition to DOE implementing stricter standards on washing machines. They want the consumers to influence the market, not the market (through DOE standards) to influence the consumer. The fact remains, however, that all the manufacturers interviewed for this research said the growth in h-axis market share will depend on the DOE standards. A few manufacturers have begun h-axis production to get a head start on meeting DOE standards. A DOE ruling will have a major impact on U.S. manufacturers' production decisions.

Utility incentives. Manufacturers agree that the best utility incentive is one that goes directly to the customer. In order to work effectively with manufacturers, utilities need to make it clear that they stand behind the promotion of h-axis machines and have an investment in

helping the h-axis market share grow. Customer rebates and cooperative advertising will be effective tools for utilities and manufacturers to achieve this goal.

SUMMARY

The purpose of the THELMA project was to provide comprehensive research on customer response to h-axis washers to support the development of marketing efforts by the THELMA sponsors. The research for this project included components directed at customers and trade allies. Both qualitative and quantitative efforts were conducted to assess customer reactions and energy and water savings.

The research demonstrates that customers are generally unaware of h-axis washers and that the potential market is fairly large if key market barriers are overcome. Key barriers include low awareness of the technology and benefits, manufacturers' historical reluctance to promote the technology, trade ally lack of awareness, and price.

The energy and water savings analysis shows that average customers can save $43 to $106 per year in combined savings. However, these savings can vary significantly based on the number of loads washed per week, the mix of hot and cold water loads, the presence of a high spin speed feature (to reduce drying time), the local utility rates, and the h-axis washer model used.

Results suggest that utilities can address these barriers by increasing customer awareness; answering key customer questions about reliability, access and capacity; highlighting the key benefits; targeting customers who can afford the current machines; and working to reduce the price barrier through incentives and financing. Utilities will also need to support the standards-setting process since this is driving much of the current manufacturers' development plans, but they will also need to work collaboratively with manufacturers to demonstrate that these machines have a market and can be successfully introduced.